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IZVORNI ZNANSTVENI RAD
ORIGINAL SCIENTIFIC PAPER

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Klinička studija učestalosti artroze čeljusnog zgloba u mlađih muškaraca

Clinical Investigation of Temporomandibular Joint Arthrosis Frequency in Young Males

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Sažetak
Svrha rada bila je istražiti koliko su česti simptomi, klinički znakovi te dijagnoze artroze čeljusnog zgloba u odnosu prema gubitku stražnjih zuba u populaciji muških ispitanika mlađe životne dobi. Klinički su pregledana 190-orica novaka Hrvatske vojske u dobi od 19 do 27 godina. Krepitacija i bol u čeljusnom zglobu ustanovljeni su manualnom funkcijskom analizom. Iznos kretnji donje čeljusti mjeren je pomičnom mjerkom. Gubitak stražnjih zuba utvrđen je Eichnerovom klasifikcijom. Pouzdanost kliničke dijagnostike provjerena je temeljem nalaza magnetske rezonancije. Krepitaciju u čeljusnom zglobu imalo je 8,9% ispitanika. Osteoartroza je ustanovljena kod 3,6% ispitanika i osteoartritis kod 3,2%. Spearmanov koeficijenti ranga korelacije imao je znatnost za sljedeće varijable: krepitacija i bol $p < 0,01$; klinički znaci i: -bol $p < 0,01$; -krepitacija $p < 0,01$; -ograničenje kretnji donje čeljusti $p < 0,01$; -osteoartroza $p < 0,05$; -osteoartritis $p < 0,05$ te ograničenje kretnji donje čeljusti i bol $p < 0,01$. Raspodjela ispitanika prema Eichnerovoj klasifikaciji ne pokazuje znatnost u odnosu prema kliničkim znakovima artroze čeljusnog zgloba. U populaciji novaka nisu česti klinički znakovi artroze čeljusnog zgloba i potreba za terapijom.

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Ključne riječi
Temporomandibularni poremećaji, artroza, čeljusni zglob, manualna funkcijska analiza, Eichnerova klasifikacija.

Uvod

Temporomandibularni poremećaji obuhvaćaju heterogenu skupinu poremećaja čeljusnih zglobova i žvačnog mišićja. Najčešći su simptomi bol i patološki zvukovi u čeljusnom zglobu tijekom kretnji donje čeljusti (1, 2). Patološki zvukovi u čeljusnom zglobu mogu biti škljocanje i krepitacija (3). Škljocanje se smatra kliničkim znakom pomaka zglobne pločice. Krepitacija i škljocanje klinički su znakovi artroze čeljusnog zgloba, što podrazumijeva neupalni poremećaj koji karakterizira gubitak koštane hrskavice i eroziju koštanog tkiva. Artroza (3-5), od-

Introduction

Temporomandibular disorders (TMDs) include a heterogenous group of disorders of the temporomandibular joints (TMJs) and masticatory muscles. The most frequent symptoms of these disorders are pain and pathological sounds in TMJ during mandibular movement (1, 2). Pathological sounds in TMJ can be classified as clicking and crepitation (3). Clicking is considered to be a clinical sign of disc dislocation, while crepitation represents a clinical sign of arthrosis, a non-inflammatory disorder characterized by loss of cartilage and erosion of

nosno artritis (6) čeljusnog zgloba može imati dva klinička oblika: osteoartritis i osteoartrozu.

Ograničenje kretnji donje čeljusti također je klinički znak temporomandibularnih poremećaja (6). Zato u dijagnosticiranju artroze čeljusnog zgloba može biti popratni znak ograničeno otvaranje usta (7-10).

Provedena su mnogobrojna istraživanja o ovisnosti između dobi ispitanika, njihova okluzijskog statusa te gubitka stražnjih zuba i razvoja artroze čeljusnog zgloba (11-21). Rezultati nekih studija sugeriraju da je artroza čeljusnog zgloba češća s porastom dobi, ali se javlja i u mlađoj populaciji (11, 22). Neka istraživanja pokušala su odrediti ulogu okluzijskih čimbenika u incidenciji simptoma artroze (14, 15). Gubitak stražnjih zuba i gubitak okuzijskih dodira u potpornim zonama u mogućoj je ovisnosti sa stvaranjem ortopedske nestabilnosti čeljusnih zglobova, ali nije dokazana moguća posljedica nastanka artroze i anteriornog pomaka zglobne pločice (6, 14, 15, 20, 21). Mnoge kliničke studije pokazale su da se osteoartritis i osteoartroza javljaju kod ispitanika sa simptomima (9, 20-28) temporomandibularnih poremećaja i bez njih (7, 13, 19, 20, 29, 30).

"Manualna funkcijska analiza", prema Bumannu i Groot-Landeweeru (31), koristi se u kliničkoj dijagnostici temporomandibularnih poremećaja. Ortopedskim testovima – aktivnim i pasivnim otvaranjem usta, dinamičkim kompresijama i translacijama, pasivnim kompresijama i izometričkim ispitivanjem mišićnih skupina, utvrđuje se specifična tkivna dijagnoza poremećaja i diferenciraju artrogeni i miogeni uzroci temporomandibularnih poremećaja. U dijagnostici artroze, kao jednog od artrogenih uzroka poremećaja, utvrđuju se klinički znaci krepitacije i bolnosti u čeljusnom zglobu uporabom dimaničkih kompresija i translacija te bolnosti i mjerenjem iznosa mogućnosti otvaranja usta.

S obzirom na nerazjašnjenu etiologiju te proturječne epidemiološke podatke o poremećajima čeljusnih zglobova, provedeno je ovo istraživanje sa svrhom da se ustanovi koliko su česti simptomi, klinički znakovi te dijagnoze artroze čeljusnog zgloba u odnosu prema gubitku stražnjih zuba u populaciji muških ispitanika mlađe dobi.

Ispitanici i postupci

Istraživanje je obuhvatilo 190-oricu novaka Hrvatske vojske, a klinički su pregledani tijekom sistematskog pregleda u vojarni "Ban Krsto Frankopan" u Koprivnici. Ispitanici su bili u dobi od 19 do 27 godina. Njihova prosječna dob bila je 20,4 godine.

bone tissue. Arthrosis (3-5), or arthritis (6) of TMJ can have two clinical forms: osteoarthritis and osteoarthrosis.

A reduction in mandibular excursional movement can also represent a clinical sign of TMDs (6). Therefore, reduced mouth opening can be a side effect of arthrosis (7-10).

There are numeous investigations concerning the age, occlusional status and loss of lateral teeth with regard to TMJ arthrosis development (11-21). The results of some studies suggest that the frequency of TMJ arthrosis increases with age, but can be observed in young age as well (11, 22). Some investigations tried to determine the influence of occlusal factors on incidence of arthrosis symptoms (14, 15). The loss of lateral teeth and loss of occlusional contacts in supporting zones is possibly related to orthopedic instability of TMJs, but the plausible consequence of developing arthrosis and anterior dislocation of the disc has not been confirmed (6, 14, 15, 20, 21). Numerous clinical studies have shown that osteoarthritis and osteoarthrosis occur in subjects with (9, 20-28) and without symptoms (7, 13, 19, 20, 29, 30) of TMDs.

Manual functional analysis according to Bumann and Groot Landeweer (31) is used in clinical diagnostic of TMDs. By means of orthopedic tests – active and passive mouth opening, dynamic compression and translation, passive compression and isometric testing of masticatory muscles, one can establish a specific diagnostic procedure of the disorder, i.e. differentiate arthogenic and myogenic causes of TMDs. The diagnostics of arthrosis, one of the arthrogenic causes of disorder, clinical signs of crepitation and pain in TMJs is assessed by dynamic compressions and translations, pain and possibility of mouth opening.

With regard to unclear etiology and controversy in epidemiological data on TMDs, we performed a study in order to assess the frequency of symptoms, clinical signs and diagnoses of TMJ arthrosis in relation to the loss of lateral teeth in the young male population.

Subjects and methods

This investigation included 190 male recruits of the Croatian Army that were clinically examined during systematical health review at the "Ban Krsto Frankopan" barracks in Koprivnica, Croatia. The subjects were aged 19 to 27, mean age being 20.4 years. Male recruits were chosen due to the fact that they represent a specific population of heterogenous

Izabrani su muški novaci, jer su specifična populacija heterogenog socio-ekonomskog podrijetla, što može imati utjecaja na njihovo iskustvo s posjetima stomatologu i brizi za oralno zdravlje.

Od ispitanika su uzeti osobni podaci i postavljeno im je pitanje imaju li kliničke simptome temporomandibularnih poremećaja. Isključeni su oni s poliartritisom, akutnim traumatskim ozljedama i infekcijama u području čeljusnog zgloba. Eichnerovom klasifikacijom (32) utvrđeni su dodiri prirodnih zuba.

Iznos aktivnih kretnji donje čeljusti mjerio se pomičnom mjerkom u milimetrima (33). Otvaranje usta mjerilo se pomoću oznake na labijalnoj plohi donjeg središnjeg sjekutića u razini prijeklopa incizalnog brida gornjega središnjeg sjekutića. Lateralne kretnje mjerile su se pomoću vertikalne oznake sredine gornjega zubnog niza na labijalnoj plohi donjeg središnjeg sjekutića. Protruzijska kretnja mjerila se kao zbroj iznosa protruzijskog pomaka donje čeljusti iz habitualne okuzije anteriorno preko središnjih incizalnih bridova gornjih sjekutića te iznosa horizontalnog prijeklopa središnjih sjekutića u habitualnoj okluziji. Ispitanicima je ustanovljena ograničena pokretljivost donje čeljusti ako je kretnja otvaranja bila manja od 40 mm, a laterotruzijske kretnje manje od 5 mm. Ispitanicima se postavilo pitanje osjećaju li bol u području čeljusnih zglobova tijekom aktivnih kretnji.

U kliničkom pregledu utvrđivanja znakova i dijagnoza artroze čeljusnog zgloba koristila se manualna funkcijska analiza (31). Krepitacija i bol kod svakog ispitanika utvrđene su dinamičkom kompresijom i translacijom tijekom maksimalne protruzije iz položaja habitualne okluzije i tijekom maksimalnog otvaranja usta. Tijekom dinamičke kompresije ispitivač je stajao iza ispitanika te obostrano obavljao kranijalnu kompresiju kažiprstom i srednjakom obiju ruka na horizontalnom dijelu donje čeljusti u području mandibularnog kuta. Ispitanik je izvodio maksimalnu protruziju i otvarao usta (Slika 1).

Slijedila je dinamička translacija koja uključuje medijalnu i lateralnu translaciju za oba zgloba. Ispitivač je obavljao lateralnu translaciju kažiprstom i srednjakom kojim je radio kompresiju na kontralateralnoj strani donje čeljusti tijekom maksimalne protruzije i otvaranja usta. Dlanom druge ruke na čelu ispitanika stabilizirao je njegovu glavu. Medijalna translacija obavljala se istovjetno lateralnoj, ali se pritisak na donjoj čeljusti izvodio na istoj strani gdje je i ispitivani zglob (Slika 2). Ispitanik je izvodio maksimalnu protruziju i otvaranje usta.

Temeljem prikupljenih podataka tijekom mjerenja aktivnih kretnji te dinamičkih kompresija i transsocio-economic background which can influence their previous experience with dental visits and oral healthcare.

Personal data was collected from all subjects and they were questioned about clinical symptoms of TMDs. Subjects with polyarthritis, acute traumatic injuries and infections in TMJs were excluded. Eichner's classification for partial edentulousness was used to determine natural teeth.

Active movement of the mandible was measured by a caliper in millimeters (33). Mouth opening was measured by marking on the labial surface of the lower central incisor in the plane of the upper central incisor overbite. Lateral movements were measured by vertical marking of the midline on the labial surface of the lower central incisor. Protrusion was measured as sum of protrusional movement of the lower jaw from the habitual occlusion over the incisal edges of the upper central incisors, and the amount of horizontal overbite of the central incisors in the habitual occlusion. Reduced movement was recorded if a subject could open less than 40 mm, and for laterotrusive movement less than 5 mm. Subjects were asked about the pain in TMJ area during active movement.

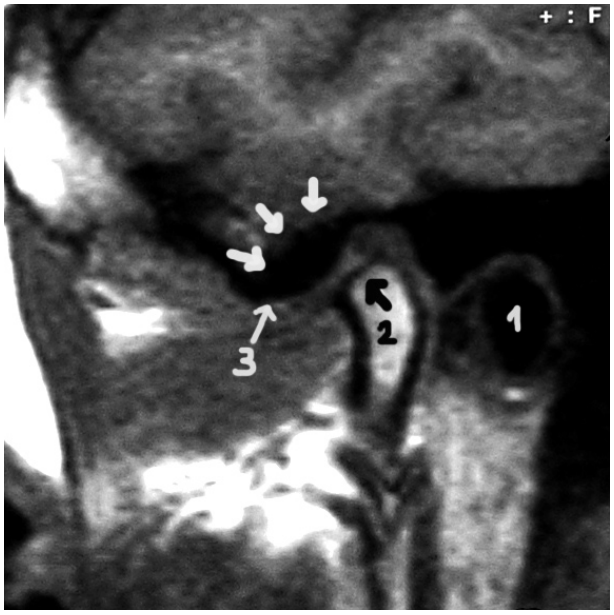
Clinical examination used manual functional analysis for determining the signs and diagnosis of TMJ arthrosis (31). Crepitation and pain was in every subject determined by dynamic compression and translation during maximal protrusion from habitual occlusion, and during maximum mouth opening. During dynamic compression the examiner was standing behind the subject and bilaterally performed cranial compression with his second and third finger on the horizontal part of the mandible, in the area of the mandibular angle. The subject was performing maximum opening and maximum protrusion (Fig. 1).

Then followed dynamic translation that includes medial and lateral translation for both TMJs. The examiner performed lateral transplation with second and third fingers that were compressing the contralateral side of the lower jaw during maximum opening and protrusion. The palm of the other hand stabilized the forehead of the subject. Medial translation is performed as lateral, only the pressure on the lower jaw is on the same side as the tested joint (Fig. 2). The subject was performing maximum protrusion and mouth opening.

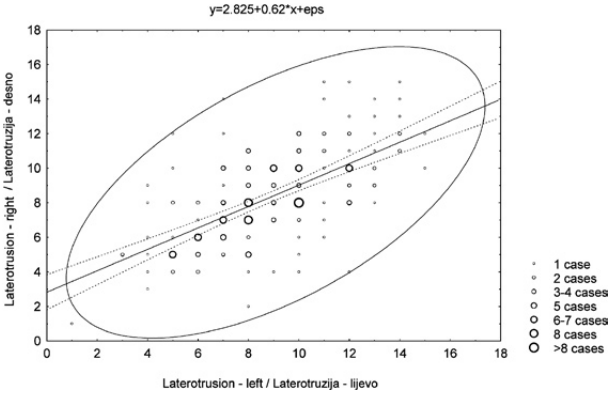
The diagnosis of arthrosis was established – based on the data from measurements of active movements and dynamic compressions and transla-

Slika 1. Postupak dinamičke kompresije u položaju maksimalno otvorenih usta
Figure 1. Dynamic compression in maximum mouth opening

Slika 2. Postupak medijalne dinamičke translacije za lijevi čeljusni zglob
Figure 2. Medial dynamic translation for the left TMJ



Slika 3. Prikaz artrotičnih promjena čeljusnog zgloba na snimci magnetske rezonancije u sagitalnoj ravnini (strjelice) (1, vanjski zvukovod; 2, kondil; 3, zglobna kvržica)
Figure 3. Arthrotic changes in TMJ on MR imaging in a sagittal plane (arrows: 1 outer ear canal, 2 condyl, 3 articular eminence)



Slika 4. Prikaz frekvencijskog točkastog dijagrama laterotruzijske kretnje za lijevu i desnu stranu s odgovarajućom regresijskom linijom
Figure 4. Frequency dotted diagram of left and right laterotrusive movement with the corresponding regression line

lacija postavljene su dijagnoze osteoartroze, ako je bilo krepitacije bez boli. Dijagnoza osteoartritisa postavljena je kada je postojala krepitacija i bol u čeljusnom zglobu (3-6).

Valjanost kliničke dijagnostike temporomandibularnih poremećaja provjerena je magnetskom rezonancijom, kao najprihvatljivijom radiološkom metodom dijagnostike poremećaja čeljusnog zgloba, jer

tions – if only crepitation was present. Arthrtitis was diagnosed when crepitation and pain were present in the TMJ (3-6).

The reliability of the clinical diagnostics of TMDs was crosschecked by magnetic resonance (MR) as the most acceptable radiological method of diagnosing TMD, since it enables the analysis of hard and soft tissue. Clinical diagnosis of arthrosis

omogućuje analizu i tvrdih i mekih tkiva. Klinički nalaz artoze čeljusnog zgloba kod osam pacijenata pregledanih u Zavodu za stomatološku protetiku Stomatološkog fakulteta u Zagrebu, bio je identičan nalazu magnetske rezonancije od ukupno 59 pacijenata kojima je temeljem te pretrage utvrđen artrogeni oblik temporomandibularnih poremećaja – artroza i diskopatija čeljusnog zgloba (Slika 3) (34).

Ispitanici su raspoređeni i prema Eichnerovoj klasifikaciji djelomične bezubosti s obzirom na broj i položaj zuba u potpornim zonama zubnih nizova (32). Klasifikacija obuhvaća antagonističke dodire prirodnih stražnjih zuba (pretkutnjaka i kutnjaka) koji tvore potporne zone. Postojanje ili gubitak zuba u potpornim zonama određen je pojedinim klasama. Klasa I (s podgrupama I/A, I/B i I/C) označava sačuvane dodire u sve četiri potporne zone, bez obzira na broj izgubljenih zuba. Klasa II znači sačuvanost dodira u trima, dvjema ili u jednoj potpornoj zoni (podgrupe II/A, II/B i II/C) te dodire samo u području prednjih zuba (podgrupa II/D). Klasa III je djelomični gubitak zuba u obje čeljusti, ali bez antagonističkih dodira zuba (podgrupa III/A) s preostalim zubima samo u jednoj čeljusti (podgrupa III/B) te potpuna bezubost (podgrupa III/C).

Svi ti podaci analizirani su u računalnom programu Statistica for Windows, Release 5.5A ('99 Edition). Uporabljene su sljedeće statističke metode: deskriptivna statistika (prosjek, standardna devijacija) aktivnih kretnji (varijable: otvaranje usta, laterotruzija lijevo, laterotruzija desno i protruzija) i tkivno-specifične dijagnoze (varijable: osteoartroza i osteoartritis). Metodom linearne regresije procijenjen je odnos između laterotruzije-desno (kao zavisne varijable) i laterotruzije lijevo (kao nezavisne varijable). Spearmanov rang koeficijenta korelacije (neparametrijska statistika) koristio se kako bi se ustanovila povezanost određenih varijabli - dobi, simptoma artroze (varijable: krepitacija, bol, limitacija kretnji donje čeljusti), kliničkih znakova artroze (varijable: povećavanje boli i/ili krepitacije tijekom dinamičke kompresije i translacije lijevo i desno), tkivno-specifičnih dijagnoza artoze te pripadnosti Eichnerovoj klasifikaciji.

Rezultati

Od ukupnog broja ispitanika, njih 19 (10%) izjavilo je da ima simptome temporomandibularnih poremećaja. Od njih je 17 (8,9%) imalo simptom krepitacije, 6 (3,2%) bol u području čeljusnog zgloba, a 3 (1,6%) ispitanika imala su ograničenu pokretljivost donje čeljusti.

was confirmed in eight patients examined at the Department of Prosthodontics, School of Dental Medicine, Zagreb. Their diagnostic results were similar to the results of MR from the total of 59 patients that had arthrogenic type of TMD – arthrosis and discopathy – confirmed by MR (Fig. 3) (34).

The subjects were classified according to Eichner's classification of partial edentulousness, with regards to the number and location of teeth in supporting zones of the dentition (32). The classification includes contacts between natural lateral teeth (premolars and molars) that define the supporting zone. Presence or absence of teeth in these zones is determined by different classes. Class I (with subgroups I/A, I/B and I/C) represents sustained contacts in all four supporting zones with no regard to the number of teeth. Class II represents sustained contacts in three, two or one supporting zones (subgroups II/A, II/B and II/C), and contacts only between frontal teeth (II/D). Class III represents partial loss of teeth in both jaws, but without contacts (subgroup III/A), with remaining teeth only in one jaw (subgroup III/B), and edentulous patients (subgroup III/C).

The data was analyzed by means of a computer program Statistica for Windows, (release 5.5A, 99 edition). Following statistical methods were used: descriptive statistics (mean, standard deviation) of active movement (variables: mouth opening, left laterotrusion, right laterotrusion), and tissue specific diagnostic processes (variables: osteoarthrosis and osteoarthritis). Linear regression was used to assess the relationship between left (independent variable) and right laterotrusion (dependent variable). Spearman's rank of correlation coefficient (nonparametric tests) was used in order to establish the correlation between some variables: age, arthrosis symptoms (variables: crepitation, pain, limited lower jaw movement), clinical signs of arthrosis (variables: increase of pain and/or crepitation during dynamic compression and translation left and right), tissue specific diagnostic of arthrosis and group in Eichner's classification.

Results

Out of a total number of subjects, 19 (10%) claimed symptoms of TMD. Seventeen (8.9%) had crepitation symptom, 6 (3.2%) had pain and 3 (1.6%) limited movement of the mandible.

Table 1 shows the results of measurements of active movements of subjects. A straight regression line on the diagram of frequency comparison

U Tablici 1 predstavljeni su rezultati mjerenja aktivnih kretnji ispitanika. Pravilna regresijska linija na dijagramu usporedbe frekvencijskih vrijednosti utvrđuje međusobnu simetričnost lijeve i desne laterotruzijske kretnje. Metoda linearne progresije pokazala je da je y (laterotruzija-desno) = 2,825 + 0,62 * x (laterotruzija-lijevo). To znači da, povećanjem lijeve laterotruzijske kretnje za 1 mm, desna laterotruzijska kretnja poraste za 0,62 mm. (Slika 4).

Kliničkim pregledom utvrđena je krepitacija u 10 (5,3%) lijevih i 7 (3,7%) desnih čeljusnih zglobova ispitanika. Tkivno-specifične dijagnoze artroze čeljusnih zglobova ispitanika postavljene su temeljem utvrđene krepitacije i boli tijekom kliničkog pregleda. Osteoartroza i osteoartritis nađeni su kod 13 (6,8%) ispitanika (Tablica 2).

Temeljem dentalnog statusa ispitanici su podijeljeni na temelju Eichnerove klasifikacije prema sačuvanosti zubnih dodira u potpornim zonama: 91 (47,9%) ispitanik u klasi I/A, 49 (25,8%) ispitanika u klasi I/B i 39 (20,5%) ispitanika u klasi I/C. Samo 11 (5,8%) ispitanika je pripadalo klasi II/A. Tablica 3 prikazuje Spearmanove rangove korelacije između dobi ispitanika, njihove pripadnost Eichnerovoj klasifikaciji, kliničkih znakova i simptoma te tkivno-specifičnih dijagnoza artroze.

confirms the symmetry between left and right laterotrusive movement. Method of linear progression has shown that y (right laterotrusion) equals 2.825 + 0.62 × x (left laterotrusion). This finding suggests that the increase of the left laterotrusion by 1 mm increases the right laterotrusion by 0.62 mm (Fig. 4).

Clinical examination confirmed crepitation in 10 (5.3%) left and 7 (3.7%) right TMJs. Tissue-specific diagnosis of arthrosis of TMJ were established based on crepitation and pain during clinical examination. Osteoarthrosis and osteoarthritis were found in 13 (6.8%) of the subjects (Table 2).

Based on the dental status the subjects were divided according to Eichner's classification: 91 (47.9%) in class I/A, 49 (25.8%) in class I/B and 39 (20.5%) in class I/C. Only 11 (5.8%) subjects were classified as class II/A. Table 3 depicts Spearman correlation range between age, Eichner's classification, clinical signs and symptoms and tissue-specific arthrosis diagnosis.

Tablica 1. Prosjek, standardna devijacija i raspon aktivnih kretnji (u mm)
Table 1. Mean, standard deviation and range of active movement (in millimeters)

	Prosjek • Mean (mm)	Standardna devijacija • Standard deviation(mm)	Raspon • Range (mm)	
			min	max
Otvaranje usta • Mouth opening	50,0	6,5	34	68
Laterotruzija lijevo • Left laterotrusion	8,8	2,8	1	15
laterotruzija desno • Right laterotrusion	8,2	2,7	1	15
protruzija • Protrusion	4,8	2,0	0	12

Tablica 2. Raspodjela tkivno-specifičnih dijagnoza artroze čeljusnog zgloba
Table 2. Distribution of tissue-specific diagnoses of TMJ arthosis

dijagnoze • Diagnosis	lijevo • Left	desno • Right	obostrano • Both sides	ukupno • Total
osteoartroza • Osteoarthrosis	5 (2,6%)	1 (0,5%)	1 (0,5%)	7 (3,6%)
osteoartritis • Osteoarthritis	1 (0,5%)	2 (1,1%)	3 (1,6%)	6 (3,2%)

Tablica 3. Spearmanovi rangovi korelacija između dobi ispitanika, njihove pripadnost Eichnerovoj klasifikaciji, kliničkih znakova i simptoma te tkivno-specifičnih dijagnoza artroze
Table 3. Spearman correlation ranges between age, Eichner's classification, clinical signs and symptoms and tissue-specific diagnoses of arthrosis

varijable • variables	II	III	IV	V	VI	VII	VIII
I	0,016	0,157*	0,202**	0,051	0,076	0,001	0,104
II		0,096	0,068	0,072	0,066	0,087	-0,026
III			0,319**	0,512**	0,224**	0,307*	0,304*
IV				0,365**	0,460**	-0,032	0,671*
V					0,044	0,493*	0,548*
VI						-0,022	0,077
VII							-0,030

I - dob • age; II - Eichnerova klasifikacija • Eichner's classification; III - klinički znakovi • clinical signs; IV - bol • pain; V - krepitacija • crepitation; VI - ograničene kretnje donje čeljusti • limited movement of the mandible; VII - osteoartroza • osteoarthrosis; VIII - osteoartritis • osteoarthritis; * korelacija je znatna za $p < 0,05$ • correlation is significant at $p < 0.05$; ** korelacija je znatna za $p < 0,01$ • correlation is significant at $p < 0.01$

Rasprava

Artroza čeljusnog zgloba ima slične simptome kao i kod drugih zglobova ljudskog tijela. Već obavljene studije pokazuju da je artroza najčešća kod žena iznad 50 godina (6, 11). Klinički simptomi artroze javljaju se od trećeg desetljeća života (23). Čimbenici nastanka artroze mogu se podijeliti na unutarnje (dob, spol, rasa, tjelesna masa) i vanjske (trauma, biomehanika čeljusnog zgloba, erozija) (9, 11). Ovo istraživanje pokazalo je da su rijetki klinički simptomi i znakovi artroze kod mlađih muškaraca, ali postoji znatna statistička povezanost ($p < 0,05$) porasta dobi i pojave kliničkih znakova artroze.

Funkcijske površine čeljusnog zgloba prekrivene su fibroznom hrskavicom, čija je funkcija prijenos kompresijskih sila na subhondralnu kost (5, 6, 29). Gubitkom mogućnosti adapacije remodelira se funkcijska površina čeljusnog zgloba, gubi fiziološki oblik i građa, a posljedica su artrotične promjene (29). Krepitacijski zvukovi u području čeljusnog zgloba važan su klinički znak artroze čeljusnog zgloba (3-6, 28), što je potvrđeno i ovim istraživanjem ($p < 0,01$).

U populaciji djece i mlađih adolescenata Nilner (29) te Skeppar i Nilner (24) utvrdili su incidenciju krepitacije 1%. Solberg i suradnici (30) govore o incidenciji krepitacije kod 11% populacije starijih adolescenata i mlađih odraslih osoba. Bates i suradnici (9) utvrdili su krepitaciju kod 15% muških pacijenata s artrozom čeljusnog zgloba. Ćelić i suradnici (19) pronašli su krepitaciju kod 1% mlađih muškaraca, nepacijenata. Longitudinalno istraživanje 15-godišnje djece pokazalo je 1-2% prevalenciju krepitacije (18). Lobbezoo-Scholte i suradnici (25) pronašli su osteoartritis kod 8% pacijenata s temporomandibularnim poremećajima. De Boever i suradnici (17) ustanovili su bol i osteoartritis kod 9,7% pacijenata u dobi između 20 i 40 godina. Dulčić i suradnici (21) utvrdili su simptome temporomandibularnih poremećaja kod 9,3% starijih nepacijentnih ispitanika (prosječne dobi 75,8 godina). Najčešća dijagnoza osteoartritisa bila je ustanovljena kod 20,8% ispitanika. Utvrđena je povezanost simptoma temporomandibularnih poremećaja i gubitka stražnjih zuba kod pacijenata s djelomičnim protezama. Kod njih je najčešća dijagnoza bila osteoartritis (16,3% pacijenata) (22). U usporedbi ovog istraživanja, kod populacije ispitanika koji nisu bili pacijenti, utvrđeni su češći znakovi artroze čeljusnih zglobova nego u istraživanjima populacije pacijenata. Krepitacija ustanovljena u ovom istraživanju (8,9% ispitanika) veća je od rezultata studi-

Discussion

MTJ arthrosis is followed by symptoms similar to other joints in the human body. Earlier studies have shown that arthrosis is most frequently found in women aged 50 and older (6, 11). Clinical symptoms of arthrosis can be seen after the third decade (23). Factors for arthrosis development can be distinguished between internal (age, sex, race, body mass) and external (trauma, biomechanics of the TMJ, erosion) (9, 11). This investigation has shown that clinical symptoms of arthrosis in younger men are infrequent, but there is statistically significant correlation between age and appearance of clinical signs of arthrosis.

Functional surfaces of TMJ are covered with fibrous cartilage, with main function of transfer of compression forces to subchondral bone (5, 6, 29). Loss of adaptation potential leads to remodeling of these functional surfaces, loss of physiological architecture and shape, leading to arthrotic changes (29). Crepitation sounds in TMJ area are important clinical signs of TMJ arthrosis (3-6, 28). This has been confirmed by our study ($p < 0.01$).

Nilner (29) and Skeppar and Nilner (24) have reported the crepitation incidence of 1% in children and young adolescents. Solberg et al. (30) have given data on the frequency of 11% in older adolescents and young adults. Bates et al. (9) have established 15% of the male patients with TMJ arthrosis. Ćelić et al. (19) have found the crepitation frequency of 1% in a non-patient young male population. Longitudinal study of 15-year-old children has given crepitation prevalence of 1-2% (18). Lobbezoo-Scholte et al. (25) have found osteoarthritis in 8% of patients with TMD. De Boever et al. (17) have established pain and osteoarthritis in 9.7% of patients aged between 20 and 40 years. Dulčić et al. (21) have confirmed symptoms of TMD in 9.3% of non-patients (mean age 75.8 years). Most frequent diagnosis of osteoarthritis was confirmed in 20.8% of the subjects. The correlation between TMD symptoms and loss of lateral teeth was confirmed in patient with partial dentures, the most frequent diagnosis being osteoarthritis (16.3%) (22). When compared to non-patient studies there was a higher frequency of arthrotic signs in TMJ than in patient studies. Crepitation diagnosed in this study (8.9%) is higher than the results obtained from the studies on young non-patient subjects (19, 24, 29). This can be explained by different functional analysis protocols and different methods for confirming crepitation.

ja mladih ispitanika koji nisu bili pacijenti (19, 24, 29). To se može objasniti i uporabom različitih postupaka funkcijskog pregleda i utvrđivanja kliničkih znakova krepitacije.

U ovoj studiji incidencija artroze bila je kod 6,8 ispitanika, što je u suprotnosti s rezultatima Wiberga i Wänmana (27) – oni su pronašli visoku prevalenciju (66%) osteoartritisa kod mlađih pacijenata pomoću tomografije čeljusnih zglobova. Boering (28) je utvrdio radiološke znakove artrotičnih promjena kod 86% ispitanika mlađih od 20 godina, što se može objasniti procesom remodelacije i rastom kondilarne kosti. I kod 40% asimptomatskih ispitanika u dobi od 21 do 27 godina utvrđene su magnetskom rezonancijom artrotične promjene na kosti zglobne kvržice (34).

Mogućnost otvaranja usta ovisi o individualnim fizičkim proporcijama pojedinca. Artroza može uzrokovati otežanu i smanjenu pokretljivost donje čeljusti. Ovo istraživanje nije utvrdilo znatnu korelaciju između boli, ograničenih kretnji donje čeljusti i utvrđenih dijagnoza artroze, što se podudara s rezultatima nekih studija (7, 8), ali i ne s istraživanjima u kojima se ustanovila znatna razlika između skupina simptomatskih i asimptomatskih ispitanika (9, 10, 26).

Jedan od okuzijskih čimbenika, kojim se nastoji objasniti etiologija artroze čeljusnog zgloba, jest gubitak zuba u potpornim zonama (14). Sarita i suradnici (35) nisu utvrdili povezanost između skraćenog zubnog niza te znakova i simptoma temporomandibularnih poremećaja, što je podrazumijevalo škljocanje i krepitaciju u čeljusnim zglobovima (12%-23% ispitanika, ovisno o broju izgubljenih zuba). S obzirom na gubitak zuba u potpornim zonama, Hiltunen i suradnici (15) utvrdili su kod starijih osoba uglavnom blage simptome ili nije bilo temporomandibularnih poremećaja. Samo 8% ispitanika starijih od 75 godina je u klasi A, prema Eichneru. U skupini pacijenata Witter i suradnici (12) nisu pronašli korelaciju između gubitka kutnjaka (tj. skraćenog zubnog luka) te znakova i simptoma artroze. Zato se ne može zaključiti da je to jedan od primarnih etioloških čimbenika nastanka temporomandibularnih poremećaja (16). Kuwahara i Maruyama (13) potvrdili su korelaciju između artroze i gubitka kutnjaka kod mlađih pacijenata. U populaciji nepacijenata Tallents i suradnici (20) pretpostavljaju mogućnost bržeg razvoja artroze kod osoba s gubitkom zuba u potpornim zonama, iako nije ustanovljena statistički znatna korelacija. U populaciji mlađih muškaraca koji nisu bili pacijenti, Ćelić i suradnici (19) utvrdili su korelaciju između boli u čeljusnom zglobu i

The incidence of arthrosis in this study was 6.8%, which is not in concordance with the results of Wiberg and Wänman (27) who have found high (66%) prevalence of osteoarthritis in young patients by means of TMJ tomography. Boering (28) reported radiological signs of arthrotic changesin 86% of the subjects younger than 20, but this can be attributed to bone remodeling and growth of condylar bone. By means of magnetic resonance in 40% of asymptomatic patients aged 21 to 27 some arthrotic changes on the tuberculum articulare were observed (34).

Mouth opening depends on the individual physical proportions of an individual. Arthrosis can impair and decrease the movement of the mandible. This study did not observe significant correlation between pain, limited movement of the mandible and arthrosis, which is in concordance with some studies (7, 8), but not with studies that have observed significant difference between groups of subjects with and without symptoms (9, 10, 26).

One of the occlusal factors used to explain the etiology of TMJ arthrosis is loss of teeth in supporting zones (14). Sarita et al. (35) did not confirm the correlation between shortened arches and signs and symptoms of TMD, including clicking and crepitation in TMJ (12-23% subjects, depending on the number of lost teeth). With regards to loss of teeth in supporting zones, Hiltunen et al. (15) have observed mild symptoms, or lack of any symptoms of TMD in older subjects. Only 8% of subjects older than 75 years can be classified in class A according to Eichner. In a patient cohort, Witter et al. (12) did not find the correlation between loss of molars (shortened arch) and signs and symptoms of arthrosis. Therefore, we cannot conclude that loss of teeth represents one of the primary etiological factors of TMD (16). Kuwahara and Maruyama (13) have confirmed the correlation between arthrosis and loss of molars in younger patients. In a non-patient population, Tallents et al. (20) speculated on faster development of arthrosis in individuals who have lost lateral teeth, although they did not find statistically significant correlation. In a non-patient population of younger men, Ćelić et al. (19) have established a correlation between TMJ pain and dynamic occluisal factors, but there was no statistically significant correlation between tooth loss in supporting zones and TMD diagnoses.

Orthopedic tests of manual function analysis have been used in the diagnostics of arthrosis, and this is substantial addition to clinical examination

dinamičkih okluzijskih čimbenika, ali nije bilo statistički znatne korelacije između gubitka zuba u potpornim zonama zubnih nizova i utvrđenih dijagnoza temporomandibularnih poremećaja.

Ortopedski testovi manualne funckijske analize uporabljeni su u dijagnosticiranju artroze, što je znatan doprinos u provedbi kliničkog pregleda temeljenog na konvencionalnim metodama stomatološkog pregleda (31). Artrotične promjene površina čeljusnih zglobova, ponajprije zbog boli u slučaju osteoartritisa, zahtijevaju dekompenzacijsku i relaksacijsku terapiju (stabilizacijska okluzijska udlaga, fizioterapija) te farmakoterapiju (31). Radiografske metode mogu se koristiti u usporedbi nalaza ortopedskih testova tijekom kliničkog pregleda simptomatskih i asimptomatskih ispitanika.

Zaključci

Ortopedski testovi manualne funkcijske analize prema Bumannu i Groot- Landeweeru uporabljene su u dijagnosticiranju artroze čeljusnih zglobova. Krepitacija te bol u čeljusnom zglobu, kao i klinički znakovi artroze čeljusnog zgloba, utvrđeni su dinamičkim kompresijama i translacijama. Temeljem rezultata ovoga kliničkog istraživanja može se zaključiti:

1. Artroza čeljusnih zglobova utvrđena je kod 13 ispitanika (6,8%) u dobi od 19 do 27 godina. Osteoartritis je utvrđen kod 7 ispitanika (3,6%), a osteoartroza kod 6 ispitanika (3,2%).
2. Statistički je znatna korelacija utvrđena između artroze čeljusnog zgloba te simptoma krepitacije i boli, ali ne i između artoze čeljusnog zgloba te ograničenosti kretnji donje čeljusti.
3. Nema statistički znatne korelacije između artroze čeljusnog zgloba i gubitka stražnjih zuba, tj. pripadnosti Eichnerovoj klasifikaciji.

Zahvala

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based on conventional methods of dental examination (31). Arthrotic changes of TMJ surfaces, especially due to the pain in the case of osteoarthritis, demand decompensating and relaxing therapy (stabilizing occlusal splint, physiotherapy), and pharmacotherapy (31). Radiographic methods can be used in order to compare orthopedic tests during clinical examination of individuals with or without symptoms.

Conclusion

Orthopedic test according to Bumann and Groot Landeweer have been used in diagnostics of TMJ arthrosis. Crepitation and pain in TMJ, as well as clinical signs of TMJ arthrosis, have been established by means of dynamic compressions and translations. Based on the results of this study, we can conclude that:

1. TMJ arthrosis has been observed in 13 subjects (6.8%) aged between 19 and 27. Osteoarthritis was observed in 7 subjects (3.6%), and osteoarthrosis in 6 subjects (3.2%)
2. Statistically significant correlation has been confirmed between TMJ arthrosis and crepitation and pain, but not between TMJ arthrosis and limited movement of the mandible.
3. There is no statistically significant correlation between TMJ arthrosis and loss ol lateral teeth.

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Abstract
Aim of this study was to investigate the frequency of symptoms, clinical signs and diagnosis of temporomandibular joint (TMJ) arthrosis in relation to loss of lateral teeth in the population of young males. Hundred and ninety recruits of the Croatian Army, aged 19 to 27 years were clinically examined. Crepitation and pain in TMJ was examined by manual functional analysis. The mandibular excursion was measured by caliper, and loss of lateral teeth by Eichner's classification. The reliability of clinical diagnostic was crosschecked by means of magnetic resonance. Crepitation in TMJ was observed in 8.9% of the subjects. Osteoarthrosis was determined in 3.6% and osteoarthritis in 3.2% of the subjects. Spearman's coefficient of correlation rank was significant for following variables: crepitation and pain $p < 0,01$; clinical signs and: - pain $p < 0,01$, - crepitation $p < 0,01$, - reduced movement of the mandible $p < 0,01$, - osteoarthrosis $p < 0,05$, - osteoarthritis $p < 0,05$ and reduced movement of mandible and pain $p < 0,01$. Eichner's classification does not show significance in relation to clinical signs of TMJ arthrosis. Frequency of clinical signs of arthrosis in recruits is low as well as the need for treatment.

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Key words
Temporomandibular disorder, arthrosis, temporomandibular joint, manual functional analysis, Eichner's classification.

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